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INDIAN
SANITARY POLICY, 1914

BEING A RESOLUTION
ISSUED BY THE GOVERNOR GENERAL IN COUNCIL
ON THE 23rd MAY 1914

COLLEGE OF PHYSICIANS

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INDIAN SANITARY POLICY, 1914.

RESOLUTION BY THE GOVERNMENT OF INDIA, DEPARTMENT OF EDUCATION, NOS. 885—908, DATED THE 23RD MAY 1914.

Historical summary.

THE modern history of scientific sanitation in India may be said to date from the end of the last century. Previously there had indeed been periods of useful spade work and spasms of general sanitary activity. A Royal Commission, appointed in 1859 and reporting in 1863, recommended the formation of commissions of public health in the presidencies of Madras, Bombay and Bengal, with a view to the diminution of sickness in the army, and the improvement of the health of the general population. These commissions were appointed, but were soon replaced in each presidency by a sanitary commissioner with an assistant sanitary inspector general, afterwards called sanitary commissioners, were appointed in other provinces; and the sanitary and vaccination staffs were gradually amalgamated. In 1888, Lord Dufferin's Government issued a resolution drawing the attention of local bodies and village unions to their duties in the matter of sanitation; and sanitary boards were formed in every province. But comparatively little success attended these efforts except in the larger towns. On the one side, sanitary measures and systems of western countries were applied to India without due regard to the fundamental differences of western and eastern civilisations and of the conditions of life in tropical and temperate climates : on the other side, the people were unprepared for reform or any kind of change.

2. The ravages and horrors of plague and the discoveries resulting from medical research made some real impression on the educated community in India; and a demand gradually arose for sanitary surroundings and preventive measures, such as had not been known before. Individuals left their insanitary quarters for cleaner and healthier localities, and in increasing numbers men began to realise the dangers to which they were exposed from existing conditions, and to appreciate the economic value of health and the wastefulness of sickness and premature death. Dislike of action was, however, for long persistent even among the educated. So far as the uneducated masses were concerned, their apathy, fatalism and resentment of interference constituted a formidable obstacle to all sanitary progress.

Recent activity.

3. The Governments in India have moved more rapidly of late. In 1898, the Government of India issued an important statement of policy. In 1908, imperial grants amounting to Rs. 30,00,000 (£200,000) a year were made to local Governments. A new department of the Government of India was created in 1910 in order to relieve the Home Department of education, sanitation and some other branches of the administration. In addition to sanitary conferences held by local Governments, three all-India sanitary conferences have

been convened at Bombay, Madras and Lucknow, respectively, over which the Hon'ble Sir Harcourt Butler presided as Member of the Governor General's Council in charge of the department concerned. These Conferences were attended by non-officials as well as officials, by laymen as well as professional sanitarians. Again, the Indian Research Fund Association has been founded to further the prosecution of research, and the propagation of knowledge and experimental measures generally in connection with the causation, mode of spread and prevention of communicable diseases. To this fund the Government of India make an annually recurring grant of 5 lakhs of rupees (£33,333). Moreover, since the constitution of the new department of the Government of India, imperial grants have been made to local Governments and Administrations to the amount of Rs. 4,61,47,000 (£3,076,466), of which Rs. 55,23,000 (£368,200) are recurring, and Rs. 4,06,24,000 (£2,708,266) non-recurring. In addition, grants amounting to Rs. 82·33 lakhs (£548,866 a year have been made to district boards in certain provinces, a substantial portion of which will, it is hoped, be expended on rural sanitation. These grants have rendered practicable the execution of schemes which a few years ago seemed beyond the limits of financial possibility; and there can be little doubt that the movement for sanitary reform is now well established and progressive throughout the country.

4. There has thus been progress although the rate has hitherto been slow. In the land of the ox-cart one must not expect the pace of the motor car. The truly remarkable improvements effected of late years in the

health of the army in India, in the case of Indian no less than British troops,* cannot be expected in connection with the civil population. In the case of the army, the problem is concerned mainly with well nourished adults, all of whom are selected lives, living in sanitary surroundings, under military discipline. Moreover, so soon as a soldier becomes unfit for active service, he leaves the army and forms part of the civil population. In the case of the civil population, the conditions of the problem are very different, and sanitary reform has still to grope its way through a labyrinth of difficulties. In order to be successful it must conform to three cardinal principles :—

Cardinal principles.

(1) it must rest on a knowledge of the people, their conditions of life, their prejudices, social customs and habits, their surroundings and financial means ; and it must secure their co-operation ;

(2) it must recognise the diversity of local conditions in a country which includes numerous

---

* Year	British troops.		Indian troops.	
	Constantly sick.	Death rate.	Constantly sick.	Death rate.
1875-1879 . . .	62·40	20·37	44·04	19.93
1880-1884 . . .	67·54	16·30	41·40	19·00
1885-1889 . . .	74·85	15·11	33·06	12·90
1890-1894 . . .	85·63	15·09	34·66	13·48
1895-1899 . .	87·68	17·14	30·10	11·34
1900-1904 . . .	64·58	13·03	27·20	10·87
1905-1909 . . .	47·21	8·93	22·31	6·78
1910 . . .	31·90	4·66	21·10	4·89
1911 . . .	28·80	4·89	19·80	4·48
1912 . . .	28·90	4·62	20·10	4·42

communities, castes and creeds and which exhibits almost every variety of climate, temperature, humidity and level of sub-soil water, from the deltas of Bengal with their steamy atmosphere and dense lush vegetation to the burnt brown hills of the north-west frontier;

(3) its introduction must be preceded by preliminary local surveys, inquiry, or experiment.

Sanitary organisation.

5. As a result of the Plague Commission's report Lord Curzon's Government took up with vigour the reorganization of the sanitary department. Research institutes were started and an appointment of Sanitary Commissioner with the Government of India was created. The functions of this officer were to advise the Government of India upon sanitary and bacteriological questions, to settle with local Governments the principles on which an advance should be made and to organise and direct research throughout India. The arrangement was not completely successful. Among the disadvantages, the separation of research from clinical work deterred men from entering the department, and the office work in connection with research prevented the Sanitary Commissioner from undertaking wide and constant touring. The organisation was accordingly modified in 1912. The Sanitary Commissioner is now the independent adviser to the Government of India in all technical and sanitary matters, but all questions of personnels as well as the administration of the bacteriological department and research generally have been placed under the control of

the Director-General, Indian Medical Service, with the Sanitary Commissioner as his staff officer.

6. The sanctioned strength of the superior sanitary organisation in India now is :—

(*a*) A Sanitary Commissioner with the Government of India.

(*b*) A bacteriological department comprising—

(*i*) thirteen laboratory appointments distributed as follows :—

Central Research Institute .	1 Director and 3 Assistants.
Bombay Bacteriological Laboratory . . .	1 Director and 2 Assistants.
King Institute of Preventive Medicine, Madras	1 Director and 1 Assistant.
Pasteur Institute, Kasauli .	1 Director and 1 Assistant.
Pasteur Institute, Coonoor .	1 Director and 1 Assistant.

(*ii*) fifteen new appointments recently sanctioned for the prosecution of research work and direct investigation in the field.

(*c*) The following establishments under local Governments:—

Province.	Sanitary Commissioners.	Deputy Sanitary Commissioners.	HEALTH OFFICERS (*a*)		SANITARY ENGINEERS.	
			1st class.	2nd class.	Sanitary Engineers.	Deputy or Assistant Sanitary Engineers.
Madras . . .	1	3	12	19	1	6 (*b*)
Bombay(*c*) . . .	1	5	4	9	1	..
Bengal . . .	1	5(*d*)	6	17	1	2
United Provinces .	1	4	11	17	1	3
Punjab . . .	1	2	2	5	1	1
Burma . . .	1	2	4	16	1	2(*e*)
Bihar and Orissa .	1	3	2	8	1	2(*f*)
Central Provinces .	1	...	...	2	1	...
Assam . . .	1(*g*)	1	...	...	1(*e*)	...
North-West Frontier Province.	1(*g*)	1	1	1(*h*)	...	...
Delhi . . .	1(*i*)	...	3(*j*)	...	1	...
Total .	11	26	45	94	10	16

(*a*) Appointments of health officer in Presidency towns and Simla are not included.

(*b*) Five of these are temporary appointments.

(*c*) In addition to the officers shown in this statement, the Director, Vaccine Institute, Belgaum, is also a sanitary officer.

(*d*) There is also a temporary appointment.

(*e*) Temporary.

(*f*) One of these is temporary.

(*g*) The administrative head of the medical department is also the Sanitary Commissioner.

(*h*) There are also four 3rd class health officers in the province.

(*i*) The Sanitary Commissioner with the Government of India is also Sanitary Commissioner, Delhi.

(*j*) Two of these are temporary.

In their resolution, dated the 23rd May 1912, the Government of India provided for a large increase in the number of deputy sanitary commissioners and for the appointment of health officers (of the first class for larger municipalities and of the second class for the smaller towns) on the lines of detailed proposals received from local Governments. Twelve additional appointments of deputy sanitary commissioner, thirty-five appointments of health officer of the first class and a large addition to the number of second-class health officers were sanctioned in 1912 and 1913, the entire cost of the additional deputy sanitary commissioners on the basis of the scale of pay fixed for Indians and half the cost of the health officers being met by imperial grants. The Government of India also advised local Governments to take powers, where these did not exist, to require a municipality to appoint a health officer and to veto the appointment of an unfit person. Such powers already exist in the Bombay presidency, and have recently been taken by legislation in Bengal. Simultaneously, the Government of India recommended the system in force in Madras whereby every municipality is required to employ one or more trained sanitary inspectors in proportion to population. Sanitary inspectors are now being employed in large numbers in towns. In addition the civil surgeon in every district is the sanitary adviser of the local authorities and in most provinces controls the vaccination staff. The provision of an increased staff of sanitary engineers is engaging urgent attention.

The Government of India attach great importance to the organisation of voluntary agencies and have recently made a grant of Rs. 20,000 (£1,333)—a sum equivalent to that given by the Bombay Government—to the Bombay sanitary association, which was founded in 1903, and now has corresponding branches in several districts and native states.

7. The policy of the Government of India is to keep the control of research under itself, but to decentralise other branches of sanitation. The creation of an imperial department is no departure from that policy, and the large imperial grants already mentioned have been made without any interference with provincial Governments. While the general direction of a policy of public health must remain with the central Government, all detailed control and executive action are, and will be, left to local Governments. The sanitary commissioner with the Government of India is a touring officer empowered to consult and confer informally with local Governments and their officers upon matters connected with sanitation. He is not permitted to encroach upon the authority of local Governments over the officers under their control.

8. The position of provincial sanitary commissioners towards the admininistrative heads of the medical department varies somewhat in different provinces. The Government of India do not wish to interfere with the arrangements which local Governments may consider best suited to local conditions, but they desire to insist on the importance of defining the functions of the two officers and securing to the sanitary commissioner the position of responsible technical adviser to the local Government in all matters affecting public health.

9. In every province, sanitary boards have been composed with varying powers, some being merely

advisory, others having authority to sanction schemes and allot funds. These boards are composed of officers belonging to the medical, sanitary, engineering and other branches of the civil services with the addition of non-officials. The Government of India view with favour and confidence the devolution of financial authority and responsibility to these boards, and they commend to local Governments the appointment of a permanent salaried secretary to the board where this has not been done. They believe that such an appointment, wherever made, has resulted in an increase of efficiency.

Training of Staff.

10. Arrangements for training the superior sanitary staff are now engaging the attention of the Government of India. The chief difficulty at present is to provide courses in practical hygiene and in the study of the bacteriology and etiology of tropical diseases. It is hoped in the near future to make arrangements in India for the former and to utilise the schools of tropical medicine at Calcutta and elsewhere for the latter. Meanwhile, a British diploma in public health is required from candidates for the post of deputy sanitary commissioners and health officers of the first class. The problems of public health in India are vitally complicated by the fact that biting insects are a prominent factor in the dissemination of disease, and it is obviously desirable to provide in India, as soon as possible, a complete course of training for sanitary officers.

Training classes for sanitary inspectors are now held in all the more important provinces.

11. A substantial beginning has thus been made for the development of a department of public health and

Indians have been freely enlisted for it. The posts of deputy sanitary commissioner and health officer are now open to Indians. Nine deputy sanitary commissioners out of 26 and the majority of health officers are Indians. The new bacteriological department consisting of 28 officers is also open to duly qualified Indians.

As health officers and sanitary engineers gradually relieve deputy sanitary commissioners of much of the drudgery of inspection and routine work, it is hoped that the latter will be set free to deal with epidemics, and communicable diseases from a higher plane, and to consider issues of public health wider than those which they are able to review to-day. It is, therefore, important to provide in advance free interchange between them, the laboratory workers and those carrying out practical research in the field.

Research.

12. Research is slowly lifting the veil which hides the secrets of disease and mortality and opening up fields of inquiry scarcely thought of a generation ago. The discovery by Sir Ronald Ross of the part played by the mosquito in the communication of malaria and the appointment of the Plague Commission in 1898 are landmarks in the history of Indian Sanitation. In 1902, a research institute was founded at Guindy in Madras, named the King Institute after Lieutenant-Colonel King, C.I.E., I.M.S., in view of his devoted efforts in the cause of sanitation in that presidency. In 1905, Lord Curzon's Government summed up the position and the policy of the Government of India in regard to the establishment of laboratories for the study of problems of public health in India. The functions of the central laboratory were

original research, the preparation of curative sera and the training of scientific workers. The functions of the provincial laboratories were diagnosis and special research connected with local conditions. This policy has been steadily developed. The Central Research Institute has been established at Kasauli. The Plague Research Laboratory at Parel has been extended and re-equipped and is now the bacteriological laboratory for the Bombay presidency; and a proposal is under consideration to attach to it a school of tropical medicine. A research laboratory and school of tropical medicine are under construction at Calcutta. Pasteur institutes exist at Kasauli and Coonoor. A third is about to be established in Burma, and it is under discussion to establish others in Assam (where it will be combined with a research laboratory) and Bombay.

Besides the routine work connected with the bacteriological diagnosis of disease, anti-rabic treatment, the manufacture of various vaccines and sera and general research, these laboratories at different times have been the centres of many special investigations, notable amongst which are those on plague and enteric fever. It is hoped that before long each province in India will have a laboratory fully equipped for research.

Indian Research Fund Association.

13. The foundation of the Indian Research Fund Association in 1911 has marked an important era in sanitary progress. The control and management of the association are vested in a governing body, the president of which is the Member in charge of the Education Department of the Government of India. The governing body is assisted by a "scientific advisory

board" of which not less than three members have seats on the governing body. They examine all proposals for work in connection with the scientific objects of the association and report as to their importance and feasibility. The members of this board are appointed for one year, but are eligible for re-election, and they have power to add to their number. The present members are the Director-General, Indian Medical Service, the Sanitary Commissioner with the Government of India, the Director of the Central Research Institute at Kasauli, the Officer in charge of the Central Malarial Bureau and the Assistant Director-General, Indian Medical Service (Sanitary) : Sir Ronald Ross has been elected an honorary consulting member. The membership of the Indian Research Fund Association is open to non-officials. Every donor of Rs. 5,000 is entitled to become a permanent member, while every subscriber of Rs. 100 per annum can be a temporary member. Members of the association are entitled to attend and take part in the annual general meeting of the association and to receive copies of the reports and other publications issued from time to time by the association. Although, so far, the fund has been financed solely by the Government of India, it is hoped that in time Indian philanthropists will contribute towards the expansion of the association by founding chairs of research, by financing experimental research measures and otherwise.

14. The association has been active and can already point to some achievement. Out of an income of Rs. 15 lakhs (£100,000) received since its incorporation and up to the end of 1913-14, an expenditure of over Rs. 14 lakhs (£93,333) has been sanctioned. In 1911, Major S. P.

James, I.M.S., was deputed to study yellow fever in its endemic area and to draw up proposals for protecting India against the introduction of the disease. Those proposals are still under consideration. In the meanwhile, stegomyia surveys have been carried out in Calcutta, Bombay, Madras, Karachi and Rangoon and other seaports. Anti-malaria schemes based on preliminary surveys have been carried out at a cost of Rs. 6,02,000 (£40,133). Investigations are at present in progress into the problems connected with the prevalence of cholera, kala-azar, dysentery, leprosy and goitre, as well as inquiries into the pharmacology of cinchona derivatives, the use of hydrocyanic acid gas as a pulicide and the fixation of chemical standards of purity for milk and milk products. Other investigations are under consideration regarding bacteriological standards of purity for water-supplies, the different anti-cholera vaccines. and sera, the methods of water filtration and silt removal best suited to Indian conditions, and the etiology of diabetes and the fevers of short duration· These will be started so soon as more trained research workers are available. It is hoped also to carry out, during the next non-epidemic season, an experiment in plague prevention on a large scale on the lines indicated in paragraph 22.

15. Besides financing the investigations conducted by its own staff, the association gives grants-in-aid to outside research on approved lines. The co-operation of other workers has been sought, and every encouragement has been given to them. Grants for research have been made, for instance, to Professor MacMahon, Dr. Hossack and Mr. Howlett. The services of Indians

have also been enlisted. Dr. Korke is engaged in an important investigation into kala-azar, while Mr. Awati, a medical entomologist, is employed under the association. The Government of India cordially approve the policy of encouraging private enterprise in the cause of research.

16. The association has also started a journal for the publication of medical research work done in India—the "Indian Journal of Medical Research"—published quarterly. The favourable reception which has been accorded to the first three numbers is evidence of the increased interest that is being taken in sanitary science in India to-day.

17. The investigations enumerated above represent the work directly under the supervision of the Government of India. The local Governments also are fully alive to the importance of research, and in seven provinces nine special officers are at present engaged in investigating the causes underlying the local prevalence of malaria and devising suitable schemes for the mitigation of that disease.

Malaria.

18. It remains to consider the results of research as applied to the chief tropical diseases, always remembering that they are liable to revision or modification in the light of further investigation and discoveries. The most important tropical disease is malaria. After allowance has been made for the tendency to attribute to fever deaths from other causes, malaria stands out as universally prevalent in India, and in many tracts is a scourge far greater than either plague or cholera. It maims as well as kills and causes more sickness, misery and death than

any other single disease. Measures for the prevention of malaria aim at breaking the cycle of infection in two ways, (*a*) by attacks on the parasites in man, and (*b*) by the destruction of mosquitoes. To the former class belong the different systems of quinine prophylaxis and treatment; and to the latter, all those measures which aim at abolishing mosquito breeding grounds. Both methods have been successful in other countries and both have been tried extensively in India. The following propositions represent the experience gained up to date :—

(1) The conditions and causes underlying the prevalence of malaria vary greatly in different places, and no one anti-malarial measure is suitable for all.

(2) Quinine both as a prophylactic and curative agent is of great value to the individual. Its powers of saving life, alleviating sickness and destroying sources of infection cannot be over-estimated. There should be no relaxation in the efforts to educate the people in the use of the drug: and its sale by shopkeepers in rural areas might well be encouraged.

(3) The regular administration of quinine to children in schools during the malarial season is a practical measure of easy application and of proved utility: it is valuable alike for its immediate good effects on the health of the scholars and as a means of spreading knowledge of the use of quinine.

(4) In any community under control quinine prophylaxis properly carried out is a valuable weapon in the fight against malaria: in India with its free population, the ignorance and apathy of the masses, their prejudice against the drug, their objection to medicine when not actually suffering from illness, and the fact that it must be continued over an indefinite number of years, greatly limit the value of quinine prophylaxis.

(5) In anti-larval operations it is not necessary to abolish all breeding grounds of mosquitoes, even of known carriers of malarial infection: a marked amelioration in health conditions will ensue if the chief breeding grounds of the malaria-carrying mosquitoes are cleared.

(6) Malaria surveys have brought to light important and unexpected facts regarding the causation of malaria in particular localities. For instance, the enquiries of Major Liston and Dr. Bently in Bombay disclosed the fact that malaria did not arise from the swampy surroundings of the city and that the malaria-carrying mosquito was *N. stephensi* which bred in the numerous wells attached to private houses. Again, Major Christophers has demonstrated that malaria in the Andamans is due to a species of mosquito *M. ludlowi* which breeds in the brackish water of the creeks and that the mosquitoes infesting the rice-fields in the neighbourhood are innocuous.

(7) Notwithstanding the initial expense, those anti-malarial measures should be chosen which will act automatically, be independent of outside help and permanent in their effects: those which require regular repetition, constant attention or active co-operation on the part of the people, are, under present conditions, seldom durably effective.

(8) The treatment of permanent collections of water is important whether it be effected by (*a*) water tidiness, through sloping of banks and clearing of weeds, or (*b*) stocking with fish of proved utility as mosquito destroyers, or by both methods.

19. The Government of India have arranged classes for instruction in practical malaria work twice a year. The course is so planned that each member of the class takes an actual part in the preparation of a malaria survey which will eventually be the basis of a practical scheme of malaria prevention. Already 155 medical officers in civil and military employ have passed through the classes. It is hoped before long to spread a large number of trained and active workers over the whole of India.

The Lucknow Sanitary Conference recommended that a malariologist and engineer should be deputed to Italy to study the methods of "colmate" and "bonificazione" under the auspices of the Indian Research Fund Association, and it is hoped to arrange for their deputation. The effect of silt deposit on the malarial conditions of deltaic areas in India is also receiving attention; and interesting experiments are being conducted by the Government of Bengal at Berhampur. Experiments in clearing jungle and undergrowth will shortly be undertaken.

Plague.

20. The Plague Research Commission, which was constituted in 1905 and is still continuing its investigations, has thrown much light on the etiology and epidemiology of the disease. The chief conclusions that have been reached so far may be summarised as follows :—

(1) In India, where the pneumonic form of the disease is relatively rare, plague is essentially a disease of rats communicable to man and a few of the lower animals; an epidemic amongst men is directly dependent upon an epizootic amongst rats.

(2) Plague spreads from rat to rat and from rat to man through the agency of the rat flea.

(3) The plague bacillus under natural conditions does not long retain its vitality outside the body of the rat, the rat flea, or man.

(4) Plague has a definite seasonal prevalence, generally constant for any given place, but varying in different parts of India; investigation shows that the plague season coincides with the season of maximum prevalence of rat fleas.

(5) Infection is carried from place to place only over very short distances by the spontaneous movements of rats: in other cases, infection is carried either (*a*) by the agency of man or personal effects acting as a means of transport for infected fleas, or (*b*) by means of

merchandise, chiefly grain, which may contain rats as well as fleas. It is not yet established which of these two agencies is the more important, but recent work, both in India and the Far East, has emphasised the importance of grain as a vehicle for the transmission of infection.

(6) In comparatively few places in India does plague infection survive the adverse conditions of the non-epidemic season: such places are usually either (*a*) large town, or (*b*) places which have been infected late in the epidemic season.

(7) In places which have suffered from repeated and severe epidemics of plague, the rats have become less susceptible to plague than are the rats in places which have remained plague-free or have suffered but slightly.

21. These conclusions have been arrived at after much careful and painstaking research and constitute a great advance on the knowledge of plague, which was available when, in 1896, it first appeared in Bombay. They point, apparently, to a simple solution of the plague problem—no rats no plague. But this solution is not attainable unless the population concerned is convinced of the danger of living in close association with the rat and is ready to co-operate in its extermination. Unfortunately, attempts at rat destruction by trapping or poison frequently meet with active opposition. Experience in India suggests that owing to the excessive fecundity of the animals, general rat destruction, even

when applied to extensive areas, gives only a temporary reduction of rat infestation and has a limited sphere of usefulness as an anti-plague measure.

22. In one direction, however, well directed efforts at rat destruction may prove useful. In each epidemic a number of places are infected late in the season and in certain of these plague survives the non-epidemic period only to break out in a virulent form when the conditions of spread again become more favourable. These localities are potential foci of extensive infection. It would seem important to concentrate the energies of the plague preventive staff on them in well organised schemes of rat destruction carried out during the quiescent period before the commencement of the next epidemic season.

23. Much can be done, indirectly, to reduce the number of rats in towns and villages, by diminishing their food supply. In any place the number of rats is in proportion to the quantity of food which they can obtain. Efficient scavenging and the protection of food-stuffs from the depredations of rats are important from this point of view. The markets, grain stores and shops, in most parts of India, are so placed and constructed as to give food and shelter to large numbers of rats. Experiments are being carried out with a view to discovering the best practical means of disinfecting grain stores and godowns. It is not practicable at present to remove grain markets and godowns outside towns, to prevent them from being used as dwellings for men, to insist on solid masonry buildings, or to prohibit the stabling of horses and cattle in the precincts of dwelling houses. But these measures and the storage of grain in bulk

instead of in bags may, with the progress of education, hereafter enter the zone of practicability. The exclusion of rats from houses is important. In several provinces experiments with different types of so-called rat-proof houses have been made with varying degrees of success. The results suggest that no form of house could remain rat-free for long in India owing to the habits of the people. Even were this not the case it would obviously be impracticable, for financial reasons, to render dwelling-houses in the towns and villages of India rat-proof on anything like a large scale. On the other hand, the individual can protect himself by providing his house with masonry floors and walls and windows enough to give ample light and air to every room and by preventing accumulations of rubbish amongst which rats can build their nests. The rat requires shelter for breeding, is mainly nocturnal in its habits and prefers darkness to light.

24. Three other measures remain to be considered—evacuation, disinfection and inoculation. The evacuation of all houses in large towns, on the occurrence of rat mortality therein or human plague cases in adjacent dwellings, is rarely possible, but in villages and parts of smaller towns it is a valuable means of checking an epidemic of plague. Disinfection to be efficacious should be directed against the rat and the rat-flea. It is of little value when it leaves both untouched. The practical objections to compulsory inoculations with anti-plague vaccine on a large scale continue; but the safety and efficiency of inoculation as a personal preventive measure against infection has been abundantly proved, and in certain areas the prejudice against it

appears to be diminishing. The Government of India desire that every facility should be afforded to any one wishing to obtain this protection for himself or his family, and they commend to local Governments the employment of carefully selected private practitioners to this end.

Cholera.

25. Cholera is now much less prevalent than formerly, but frequently occasions severe epidemics and still remains a constant cause of mortality. Epidemics have in several recent cases been traced to pilgrims returning from places of religious pilgrimage, at which there had been no recognised outbreak of the disease. In 1912, Major Greig was deputed to make a special investigation of the whole subject. That investigation, which still continues, has added to knowledge regarding the propagation of cholera and has established the fact that not only cholera convalescents, but also healthy persons who have been in contact with cholera cases, can act as "carriers" of the disease. It has also been shown that the germs of the disease can be recovered from a patient's dejecta kept under natural conditions for a variable but frequently considerable period, and that flies may play an important part in the dissemination of infection. These observations, while in no way opposed to previous knowledge that cholera is a waterborne disease, accentuate the importance of careful and thorough conservancy.

Small-pox.

26. Small-pox is not a tropical disease, but it used to be so rife in India as to be associated among Hindus with its own special goddess. It now occupies a small place in the

mortality returns. This result is due to the spread of vaccination during the latter half of the last century.

Vaccination.

Formerly, nearly all vaccination was effected by human lymph, but within recent years arm-to-arm vaccination has been steadily replaced by the use of pure glycerinated or lanolinated calf lymph. The change has been doubly beneficial; it does away with the necessity of breaking the vesicle in the child's arm, a simple operation but one which exposes the wound to contamination by extraneous germs; and it ensures that the vaccination is effected with a pure and fully potent lymph with consequent increase of protection. The change has been especially welcomed by educated Indians. Madras, Bombay, Bengal, Burma, the United Provinces, the Punjab, the Central Provinces and Assam have each now their own calf lymph depôts, and the opening of another for the province of Bihar and Orissa is under consideration. Grants of ₨2,00,000 (£13,333), were given from imperial revenues last year to improve the depôts in the United Provinces, the Punjab and Burma, and to establish the new depôt in the Central Provinces.

Tuberculosis.

27. The prevalence of tuberculosis throughout India especially in the large cities is undoubted. In some of the latter, the mortality exceeds that of certain crowded European cities The difficulties of coping with the disease in India are immense and demand the fullest co-operation between Government and private agency. One or more officers will be detailed to investigate the causes underlying the disease, to organise the diffusion of information, and to advise regarding measures for the prevention

of infection: the services of Dr. Lankester have already been secured by the Indian Research Fund Association for this purpose. Recent research appears to show that tuberculosis in India is chiefly human and not bovine in origin. Indian cattle so far as is known are practically free from the disease, and Indians do not as a rule drink unboiled milk. The source of the disease is in the homes of the people, and the relief of congested areas and the provision of sufficient light and air in human tenements are preventive measures of great value. The Government of India invite attention to the recommendation of the Lucknow sanitary conference that circumspection should be exercised before instituting at considerable cost further large sanatoria. They consider that inexpensive buildings suitable as model dwellings for the people may prove of great educative value and they desire to encourage tuberculosis hospitals and dispensaries. They also take this opportunity of communicating the warning of the Lucknow conference against the indiscriminate use of tuberculin by unqualified medical practioners.

Infant mortality.

28. No summary of public health is complete without a reference to infant mortality. In 1911, of 4,752,152 male children and 4,457,551 females born in India, 1,016,823 males and 873,677 females died. In other words, about one-fifth of the children born died within the first year of their life. It is difficult to arrive at the actual causes of this high rate of mortality. The figures at the disposal of Government are often of doubtful accuracy, and the comparison of figures from different localities is frequently fallacious. On a broad view of the subject

the causes of infant mortality may thus be summarised: (1) malaria operating both directly on the infant and indirectly through the mother; (2) diseases due to insanitary surroundings and exposure to infection especially through the medium of flies; (3) diseases due to ignorance on the part of the mother with regard to the feeding and care of the infant; (4) accidents of child birth and diseases attendant thereon. For (3) and (4) the custom of early marriage and the primitive and insanitary methods of midwifery are largely responsible. The latter lead directly to the death of the infant from tetanus and other diseases, and indirectly increase the infant mortality by depriving children of their natural nourishment either through the death of the mother or the failure of her milk as the result of sepsis. Deficiency in the supply of cow's milk has not been proved to be a predominant cause of infant mortality in India; but the question of improving both the quality and the quantity of the milk-supply without increasing its cost is engaging earnest attention (*vide* paragraph 42).

It is hoped that the instruction of mothers and midwives will engage the attention of all medical women practising in India and especially interest the women's medical service which has recently been established. In some of the large cities in India, notably Calcutta, Bombay and Madras, nurse health visitors have been appointed by municipalities to visit the people in their homes and assist and instruct mothers in the elementary principles of hygiene. In Bombay, an interesting experiment has been started by Dr. Turner in the form of lectures to the midwives. Another is likely to be made under the auspices of the Indian Research Fund Association in Delhi, where it is proposed to detail two trained nurses for work as health visitors.

Vital statistics.

29. The course of sanitary reform is much impeded by the want of complete and accurate vital statistics. Without them it is difficult to gauge the effects of sanitary measures or to convince people of their efficacy. The difficulties in the way of improving the reporting and recording agency especially in rural areas are great; but systematic checking and supervision of returns should yield good results. Dispensary returns and voluntary notification by private medical practitioners are useful as checks but are only partial in their scope. A comprehensive scheme for the improvement of general reporting is required. The Government of India invite the attention of local Governments to the importance of the subject.

30. The Government of India recognise that differences in local conditions preclude the issue of any general instructions, but they commend the following propositions for consideration :—

(*a*) The reporting of vital occurrences should not be left exclusively to the municipal staff; reporting by the head of the household also should be insisted on. The two reports would then be available to check one another.

(*b*) The actual registration should be done not as an extra duty but by special registrars who should, if possible, possess a medical qualification. In the case of deaths, inquiries regarding the symptoms of the deceased could then be made from the person reporting and some check on the diagnosis of the cause of death could be obtained. Many people are attended during their last illness by unqualified persons or die without medical attendance.

(*c*) The registrar should be required to verify at least 10 per cent. of the reported births and deaths, and this verification should, as far as possible, include all particulars such as cause, date, age, sex, place, etc.

(*d*) The health officer should be in charge of the vital statistics in the town and should be responsible for supervising and checking the work.

(*e*) Experiments might be made in obtaining accurate registration in typical areas by means of a special staff which would also be employed in healing the sick.

Sanitary surveys.

31. Concurrently with attention to the registration of vital statistics the Government of India commend to local Governments the importance of sanitary surveys on broad lines. Something has been done in this direction and valuable reports have been drawn up, giving the real health conditions of towns and particular localities and indicating the existence of any special sickness or mortality and the definite causes underlying them. The Government of India desire that systematic working plans should be drawn up where this has not already been done with a view to mapping out the sanitary conditions of all the more important towns and localities in which sickness or

mortality is above normal. This will occupy years of steady preparation; but as deputy sanitary commissioners are relieved of much of the routine work which at present they have to perform they should be able to carry this undertaking to a successful issue. The preparation of drainage surveys in towns in advance of needs obviates waste in the long run. In the absence of such surveys, work is often commenced in a haphazard way without due consideration of a scheme as a whole.

Urban sanitation.

32. Urban sanitation has, as already observed, received much attention of late years. It falls generally under four heads, *viz.*, conservancy, water-supply, drainage and town-planning with improvement of housing and the relief of congested areas. In the forefront of these stands conservancy.

Conservancy.

33. The importance of efficient scavenging with speedy and complete removal of all night-soil and rubbish from the vicinity of habitations and its satisfactory disposal can scarcely be exaggerated. Yet probably no department of public health work is more neglected in many Indian towns. The strict rules of the caste system have for centuries relegated everything connected with this work to the outcast, and the people, as a rule, evince little if any interest in the conservancy even of their own houses. To this neglect must be attributed the plague of flies which at certain seasons is experienced in every Indian town. Apart from the discomfort which they cause, flies are known to be the disseminators of many diseases, including cholera, enteric fever, tuberculosis, dysentery and diarrhœa and are largely responsible for the heavy

mortality amongst infants. The all-India sanitary conferences at Madras and Lucknow drew prominent attention to the danger to health caused by the presence of these noxious insects, and the results of the recent "anti-fly" campaign at Delhi suggest that a large reduction in the number of flies is by no means an impossible task.

34. Whether incineration or shallow trenching or either of these methods of conservancy combined with water carriage is the best in any particular case will depend very largely on local conditions and customs. With the extension of drainage and sewerage systems, water carriage of all night-soil, with ultimate disposal on sewage farms, should give the best result. In the majority of towns, however, it will be long before this is generally practicable and the choice rests between incineration and trenching. Of the two methods, incineration is safer, and on this account, if conditions permit, is preferable. Trenching is often thought to be more economical; but the profits obtainable from the trenching or pitting of night-soil and sale of the poudrette disappear, or are largely reduced, when the expense of carriage and supervision is taken into account. The material consideration in all cases is that the removal and disposal should be prompt. As education spreads and the number of health officers and sanitary inspectors increases, improved results may be anticipated.

Water-supply.

35. Few subjects have received more attention of late than the provision of a piped supply of filtered water in towns. Complete figures are not available, but sums amounting to at least Rs. 3,51,58,297 (£2,343,886) have been spent during the last 20 years on completed schemes. Projects

costing Rs. 1,40,03,433 (£933,562) are under construction, and projects costing Rs. 1,14,44,750 (£762,983) have been prepared and sanctioned. These figures are exclusive of the expenditure in the presidency towns and Rangoon.

36. The demand for piped and filtered water-supply grows, and is likely to grow more rapidly in future. While recognising the need for treating the question with due regard to local conditions, the Government of India offer the following general observations :—

(*a*) When piped water-supplies were first introduced, in the face of opposition, it was necessary that the charges should be made as low as possible. That stage has now been passed, and there appears no good reason why water-supplies should not be conducted on a business footing and the water charged for like any other commodity. An interesting discussion on the financing of water-supplies was introduced by the Hon'ble Mr. Curtis at the Madras sanitary conference.

(*b*) On the whole, the provision of piped filtered water in towns has not been followed by that reduction in water-borne disease which might have been expected. This is probably due in most cases to the large number of wells, both public and private, which still remain in use. The closure of many of these wells is much to be desired, but the owners are unlikely to consent to this so long as the piped supply is intermittent and is drawn off hot or unpleasantly warm during the summer. In any case the substitution of a constant for an intermittent supply will shortly have to be considered as pipes get older and in-suction declares itself. The warmth of the water is more difficult to deal with, but much might be done by burying pipes deeper in the ground and carrying house pipes inside instead of outside houses.

(*c*) Excessive wastage is common and causes not only an unnecessary burden on the municipality but frequently also a defective supply in the higher portions of the distribution. The employment of a regular waste-detection staff has in most cases been found to make for economy and efficiency.

Drainage.

37. Drainage schemes, on modern lines, are the basis of all sanitary improvement in urban areas. The demand for them is scarcely less than that for piped water and is steadily on the increase. As in the case of water-supply complete figures are not available, but the known expenditure during the last twenty years has been considerable and is now rapidly increasing. The expenditure on completed works outside the presidency towns and Rangoon during that period amounted to Rs. 97,65,049 (£651,003), whereas the cost of the works under construction is estimated at Rs. 1,54,20,502 (£1,028,033). In the beginning precedence over drainage was given to piped water-supply, but experience has demonstrated the advantage of introducing both concurrently. Without drainage there is no means of carrying off the surplus

water, and without piped water-supply it is difficult to flush the drains properly.

38. When drainage schemes on modern lines were first started in this country there seems to have been a bias against the use of sewers and, wherever possible, open drains were adopted. Experience has shown that the preference for the open drain, and the fear that sewers would give excessive trouble, were not well-founded. On the contrary, much of the advantage of a drainage system is lost if only open drains are used, as the old system of hand-carriage latrines has to be continued. Moreover, economy in establishment is possible only in the case of a sewerage system.

Epidemic diseases.

39. The Government of India desire to invite the attention of local Governments to the importance of providing adequate facilities for the isolation of cases of epidemic diseases. The isolation of individuals suffering from infectious diseases is often desirable and sometimes necessary, and it would seem desirable to have in every important municipality a small well-built segregation hospital in charge of a qualified medical practitioner, who might be one of the medical registrars for vital statistics.

A revised set of regulations under the Indian Ports Act for the prevention of the spread of infectious and contagious diseases is under consideration.

Pilgrim centres and pilgrimages.

40. Pilgrimages necessitating as they do the collection of large numbers of persons, often more than a million, at one place at one time have an important sanitary aspect mainly in connection with cholera

(*vide* paragraph 25) and other communicable diseases. The Government of India, recently decided to examine the sanitary arrangements at the chief places of pilgrimage throughout India, and local Governments were asked to appoint provincial committees for this purpose under the presidency of the Sanitary Commissioner with the Government of India with a view to formulate practical schemes of improvement. The inquiry is still in progress, but the Government of India have already made a grant of Rs. 2 lakhs (£13,333) and promised an additional grant of 4 lakhs of rupees (£26,666) spread over four years towards the improvement of the pilgrim route to Badrinath; and they have made a further recurring grant of Rs. 20,000 (£1,333) a year for the same object. The important question of improving the conditions of the pilgrimage to the Hedjaz by Indian Musulmans is undergoing close scrutiny. The Governor General in Council anticipates that these inquiries will lead to signal sanitary improvements and promote the convenience and comfort of many millions of His Majesty's loyal Indian subjects.

Adulteration of food and drugs.

41. The adulteration of food and drugs is common and has an important bearing on public health. Provisions for dealing with adulteration of food-stuffs exist in most municipal enactments in India, but these are confined to municipal areas and are restricted in their operation. Bombay and the United Provinces have special laws dealing with the question. The Government of India have recently enquired from local Governments as to the desirability of legislation, imperial or provincial, on the subject. The question is not free from difficulty, as,

besides the necessity of fixing standards, a competent staff of analysts and inspectors is necessary, and for any real success the co-operation of the people is required.

Adulteration of milk.

42. The adulteration of milk is almost universal in Indian bazars, and a large proportion of the milk consumed is contaminated. In most cities, the milk-supply is in the hands of men ignorant of the elements of sanitation and addicted to uncleanly practices. Moreover, the milk when stored and in transit to market is liable to contamination in several ways. On the other hand, the price of milk is already very high, and the problem of improving the purity of the supply without increasing the price to such an extent as to cause hardship to the poorer classes is a difficult one.

The Lucknow sanitary conference recommended that the development of the dairy industry and the organisation of the transport and sale of milk should ordinarily precede measures of sanitary restriction ; and that there should be mutual help and co-operation between sanitarians, milk dealers and the agricultural department. That department is already considering how to develop a profitable dairy animal, a measure largely dependent on suitable and regular feeding. While local authorities should clearly insist on cleanliness in the conditions under which cattle are milked and dairy produce is manufactured, stored, or transported in towns, the removal of cattle so far as possible to cheap, healthy and natural surroundings outside cities is a measure greatly to be commended. The establishment of co-operative dairy farms in the United Provinces, the Central Provinces and elsewhere has so far been attended with success and should be encouraged. Attempts might well be made to induce *gwalas* to organise milk production outside cities and its transport to market on co-operative principles. Should these methods prove successful, it may be possible without raising the price to bring the milk supply under necessary sanitary control. The Government of India commend the whole question to the early attention of local Governments. With regard to milk standards, conditions in India differ from those in Europe, and chemical standards should be fixed by persons possessing adequate local knowledge and experience, and with due regard to local conditions.

Town-planning and relief of congested areas.

43. While much has been done to provide drainage and pure water in large cities, there can be little hope of improving their sanitary condition permanently until measures are taken to relieve congested areas and to provide broader streets and buildings more open to sun and air. The constitution in 1898 of the Improvement Trust in Bombay marked a notable step in advance. By the end of 1912-13, the Bombay Trust had incurred an expenditure of Rs. 488 lakhs (£3,253,333) towards schemes aggregating Rs. 802 lakhs (£5,346,666). Broad roads have been driven through the heart of the city, slum areas have been abolished ; and dwellings provided for the accommodation of the poorer classes. The Calcutta Improvement Trust constituted in 1911 is now developing similar schemes for the improvement and development of Calcutta. Funds for these great projects have been provided mainly from local taxation and municipal contributions, supplemented in the case of each city by an imperial grant of Rs. 50 lakhs

(£333,333) and in the case of Calcutta, by a recurring grant of Rs. 1½ lakhs (£10,000) for 60 years. In other provinces, similar works have been carried out on a smaller scale in the larger towns, notably in the United Provinces and at Lucknow.

There has been, as already stated an increasing desire on the part of the well-to-do in cities to escape from their present insanitary surroundings and to obtain houses in more open positions outside city limits. In India, as in England, municipalities are confronted by the difficulty of obtaining land for town extensions except at prohibitive cost. The multiplicity of small owners in this country, and the impossibility of persuading them to co-operate, render any considered and comprehensive plan of town extension impossible in the absence of some controlling and co-ordinating authority armed with powers of compulsion. In their letter of 26th July 1912, the Government of India indicated their opinion that where land on the outskirts of a town was mainly agricultural and could be acquired cheaply *en bloc*, the local body would probably be well advised to purchase it outright.

44. Such a policy, however, will, for financial reasons, often be impossible on a large scale. Where the cost of acquisition is prohibitive, control may be preferable to acquisition, and in their circular letter of the 26th July 1912 the Government of India drew attention to the features of a scheme under discussion in the Bombay Presidency which has now been incorporated in a Town Planning Bill. The principal feature of this scheme is that the cost is apportioned and recovered from the various persons and interests concerned in the shape of a

development contribution calculated in proportion to the increased value which is estimated to accrue to each plot on the completion of the scheme, the tax that can be levied from any one owner being limited, as in England, to one-half of the betterment estimated to accrue. The local body remains liable for any excess cost not covered by the tax. Such a scheme involves taking powers to pool and redistribute small holdings in a form suitable for building purposes. It has the advantage of reducing capital outlay while securing for public purposes a share in the profits of the transaction. The Government of India have also invited an examination of the provisions of municipal acts for dealing with insanitary areas and have inquired whether the limitations contained in the English Housing Acts on excessive compensation in areas, which, after due inquiry, have been declared insanitary, might not be introduced in India. The first step towards improvement is to fix a standard of light and ventilation suitable to local conditions; the next is to ensure that adequate building regulations providing for this standard are introduced by all municipal bodies and that a competent executive staff is appointed with full powers to carry them out. The whole question will be reviewed when the replies of local Governments have been received.

Rural sanitation.

45. The difficulties which surround rural sanitation in India are well-known and persistent. Contaminated sites, polluted water-supply, badly constructed and insanitary dwellings, the habits and prejudices of the people raise obstacles to progress which in most provinces are still well-nigh insuperable. The Government of India have informed

local Governments that they are at liberty to expend a portion of the imperial grants for urban sanitation on rural sanitation, provided practical schemes for this purpose are forthcoming; but they have postponed special imperial grants for this purpose until such schemes are more generally advanced. They fully appreciate the enormous importance of rural sanitation in a country which is mainly agricultural. Past experience and present conditions, however, indicate that the subject is still one for experiment on lines conceived to attract the co-operation of the people. Without their cordial help no sanitary staff could effectually deal with the village sanitation of the two hundred and twenty millions who inhabit rural areas in British India. The danger of employing low-paid and imperfectly trained subordinates in a matter so closely affecting village-life is now generally recognized and should never be out of mind.

46. The following observations are based on practical experience of rural sanitation:—

(*a*) Travelling dispensaries may be used to spread a knowledge of the simple facts regarding the more common diseases. For this purpose the sub-assistant surgeons in charge should be given a special training in hygiene. Once they become known to the people as healers of the sick their advice as sanitarians may become more acceptable.

(*b*) The improvement of the village water-supply is as important as it is difficult. Apparently, excellent results have been obtained by disinfection of wells with permanganate of potash. Experiments are being made in different parts of India in the use of tube-wells, etc. It might serve as an useful object lesson to use pumps and tube-wells for the provision of water at fairs, schools, hospitals and local public offices. In some localities, a tank supply alone is possible, and the difficulty is to protect even new tanks from pollution.

(*c*) In several provinces, notably in Madras, village unions, or circles, have been formed and their committees entrusted with small grants for the improvement of the sanitation of the village site. This measure might be extended experimentally elsewhere. It is calculated to encourage discussion and inquiry regarding sanitary work.

(*d*) Village midwives are, in some districts, encouraged by small grants of money and rewards to attend at the headquarters hospital for a short and simple course of training. These measures open up possibilities with reference to a reduction in infantile mortality and children's diseases generally.

(*e*) In most districts in India, the civil surgeon is also in theory the sanitary officer of the district. His duties at headquarters, however, do not allow him to tour and inspect in the district to the extent that is necessary : even in the case of epidemics in the district it is sometimes not possible for him to leave headquarters. In some provinces, district sanitary officers have been appointed and there can be little doubt that many more such appointments are required and that one of the most urgent and hopeful measures for promoting rural sanitation is the appointment of well-qualified and whole-time district health officers to control and organise all sanitary arrangements and experiments in the district.

Need for education.

47. The diffusion of sound education will, however, remain the most potent and penetrating instrument of sanitation among a population which still views it for the most part with hostility, or unconcern. The claims of hygiene as part of their educational policy were recognized by the Government of India in their educational resolution of the 21st February 1913. It may be hoped that before many years have passed educational institutions will have become missions of sanitation in their own vicinity and beyond. Meanwhile, some simple knowledge of the more common infectious diseases may with advantage be diffused. The difficulties are considerable, and systematic organisation is required. The Indian branch of the St. John Ambulance Association has offered its valuable assistance. In several provinces, pictorial leaflets are distributed, and simple lantern lectures and demonstrations are given at fairs and other large gatherings, while in Bombay popular lectures to teachers, students and others have been organised by Major Glen Liston. The Indian Research Fund Association has decided to establish a central bureau where lanterns and lantern slides, pictures, and skeleton lectures can be stocked for issue on loan. Much may be done by utili-

sing the services of municipal health officers and medical subordinates attached to travelling dispensaries and by enlisting the sympathies and active help of medical women, private medical practitioners, and private philanthropic agencies and persons. Sanitation must begin at home, and as the Hon'ble Sir Pardey Lukis and Colonel Firth, the former on the civil, the latter on the military, side have pointed out, there will never be any real advance in domestic or personal hygiene until the women of the country realise its advantages and necessity. The encourgement of medical women to preach the gospel of health inside the zenana and to organise purdah parties for simple lantern demonstration lectures and the employment of nurse visitors as in Delhi, Calcutta, Madras and Bombay, are to be commended. Periodical local conferences and publications similar to that recently issued by the Bombay Government entitled "Some recent sanitary developments in the Bombay Presidency" are very useful and keep the question of sanitation before the public mind. Other methods for preparing people to combat preventible disease and premature mortality may suggest themselves. There is room for many workers in the sanitary field. The Governor General in Council appeals with confidence to all who have interest in the well-being of India to join with him and the local Governments in a sustained endeavour to give effect to His Imperial Majesty's most gracious wish that the homes of his Indian subjects may be brightened and their labour sweetened by the spread of knowledge with all that follows in its train, a higher level of thought, of comfort and of health.

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